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DIPHThERIA BACILLI IN MICROSCOPICAL SECTIONS OF TONSILS FROM DIPHThERIA-CARRIERS *

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When it was found that certain persistent diphtheria-carriers promptly gave negative cultures after tonsillectomy and removal of adenoids as reported by Friedberg¹ and Ruh, Miller, and Perkins,² it was thought interesting to section the tonsils of diphtheria-carriers and study them for the presence and location of diphtheria bacilli. Albert³ thought from clinical evidence that the diphtheria bacilli multiplied deep in the crypts, and Kretschmer⁴ reported success in clearing up diphtheria-carriers by squeezing the tonsils so as to force the plugs of material out of the crypts. Ruh, Miller, and Perkins got positive cultures from the crypts after excision when surface cultures were negative.

The tonsils studied were from 7 diphtheria-carriers, 6 of whom had had pharyngeal diphtheria and 1 of whom was a carrier without symptoms of intoxication. All had had positive cultures from nose or throat for 21 days or over. As controls, tonsils were studied from 14 patients in the nose and throat clinic of the Cook county hospital. These patients had undergone tonsillectomy for various causes such as chronic tonsillitis, hypertrophied tonsils, arthritis, and sciatica. Unfortunately, cultures were not made from 9 of these patients, so that the possibility of their being diphtheria-carriers was not ruled out.

The tonsils were fixed in a solution of equal parts of absolute alcohol and saturated bichlorid of mercury, run through paraffin, cut, and stained by the Gram-Weigert method. Of the 7 diphtheria-carriers 6 yielded gram-positive beaded bacilli in great number. These bacilli, together with large and small streptococci and diplococci, were found chiefly in the crypts in the plugs of tissue, composed of cell debris, lymphoid cells, and polymorphonuclear leukocytes (Figs. 1 and 2).

* Received for publication May 18, 1916.

¹ Jour. Am. Med. Assn., 1916, 66, p. 816.

² Ibid., p. 941.

³ Ibid., 1913, 61, p. 1027.

⁴ Med. Klin., 1911, 7, p. 99.

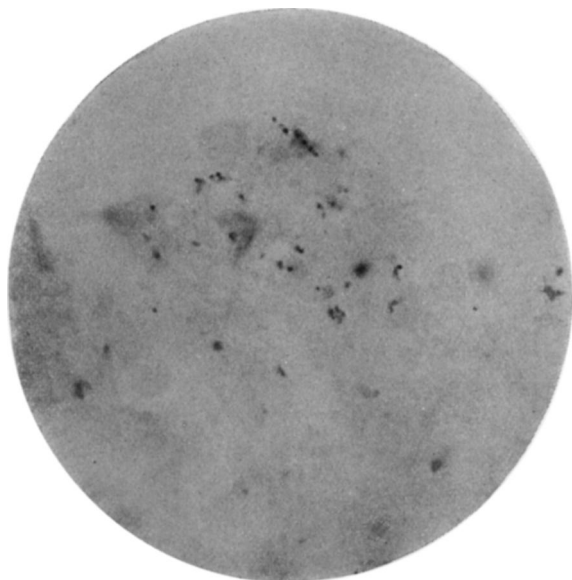


Fig. 1. Plug of tissue in a crypt, the tissue being composed of lymphoid cells and cell debris, showing gram-positive beaded bacilli.

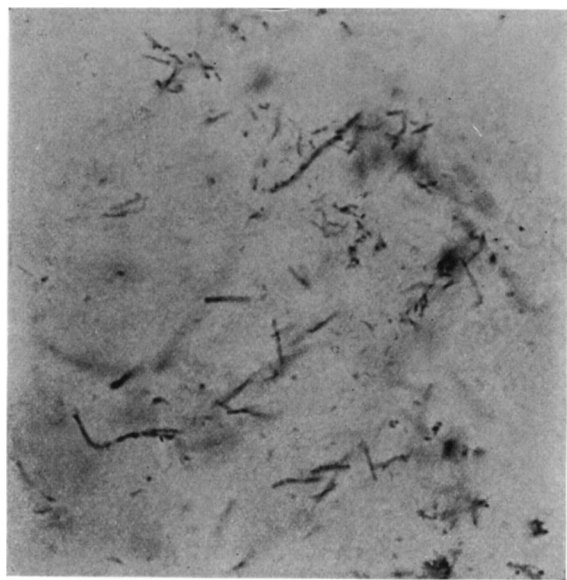


Fig. 2. Base of a crypt where the bacilli are embedded in the tonsillar tissue itself.

The bacilli were found also in the tissues lining the crypts where the epithelium was very thin. There was little or no reaction in these places on the part of the tissues; no new growth of connective tissue or accumulation of phagocytic cells (Fig. 3). The cells in the vicinity of the bacteria stained diffusely and showed some slight karyorrhexis. At some point in each of these 6 pairs of tonsils and in some cases in several places, the epithelium of the surface of the tonsil was necrotic and the bacilli were found in the tissues, showing

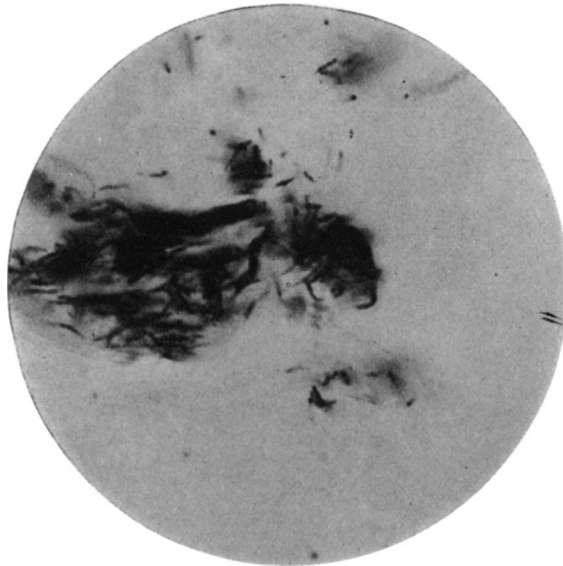


Fig. 3. Side of a crypt showing a depression into which the bacilli are densely packed. The epithelium is intact and the bacilli have not entered the tissues.

that where there are lesions the bacteria multiply on the surface as well as in the crypts. The one case which showed no gram-positive bacilli in 50 sections of the tonsils and in 50 sections of the adenoids, continued to give positive cultures from the throat for 4 days and from the nose for 19 days after tonsillectomy and removal of adenoids. In this case the bacteria were probably multiplying in some place other than the tonsils and the adenoids.

Of the 14 pairs of control tonsils studied only 2 showed any gram-positive bacilli, and these may very well have been diphtheria bacilli. These results correspond with those of Dwyer and Gignoux,⁵ who

⁵ *The Laryngoscope*, 1910, 20, p. 1042.

found in a series of 72 cases in which the tonsillar crypts were examined bacteriologically some member of the diphtheria family present in 23%, and other bacilli which are not listed as gram-negative, in 2%. Keitly⁶ in a study of the occurrence of diphtheria bacilli in normal throats concludes that the incidence of carriers in adults is from 0 to 2%, and in children from 0 to 25%.

It would seem safe to conclude from these results that the gram-positive beaded bacilli found in the tonsillar crypts of 6 of the diphtheria-carriers were probably diphtheria bacilli and not other gram-positive bacilli, which are relatively rare in the tonsillar crypts, and that the clearing up of these cases by tonsillectomy can be attributed to the removal of an important focus of infection in which the bacilli had lodged and multiplied.

⁶ New York Med. Rec., 1915, 88, p. 311.